

## **Integrated wavelength division multiplexed (WDM) transmitter design and characterisation**

TU/e and III-V Lab provide a joint PhD training environment for three PhD researchers to develop and study generic technologies for next generation WDM transmitter technology. This is in the framework of a recently awarded Marie Curie Initial Training Network project.

[http://ec.europa.eu/research/mariecurieactions/about-mca/actions/itn/index\\_en.htm](http://ec.europa.eu/research/mariecurieactions/about-mca/actions/itn/index_en.htm)

The Technical University of Eindhoven is leading in the field of Photonic Integration Technology. It has the world's best equipped university cleanroom for photonic integration. [www.tue.nl/nanolab/](http://www.tue.nl/nanolab/) The Department of Electrical Engineering is one of the nine departments of the Eindhoven University of Technology and provides BSc and MSc programs in Electrical Engineering. The department has nine research groups and has research collaborations with other departments at the Eindhoven University of Technology as well as with a large number of other universities and companies, both within the Netherlands and internationally. The department has approximately 350 employees and 600 students. The Photonics Integration research group at TU/e is within the COBRA institute. [www.tue.nl/cobra/](http://www.tue.nl/cobra/)

III-V Lab is an industrial Research Laboratory jointly established by Alcatel-Lucent, Thales and CEA Leti. Under the guidance of its members, III-V Lab conducts R&D activities in the field of micro/nano-electronics and photonics semiconductor components for different application: telecoms, defence, security, safety, space etc. These activities cover the topics including (1) Photonic Integrated Circuits (PICs) for telecoms, (2) Micro/nano-electronic circuits for telecoms: 40Gb/s, 100Gb/s and over, (3) GaN microelectronic circuits for microwave and power applications, (4) High resolution infrared imagery sensors, (5) Quantum cascade lasers (QCLs) and power lasers.

III-V Lab has established experience in industrial research and development and provides an ideal environment for Ph.D candidates who are willing to be trained to work in industries. <http://www.3-5lab.fr/>

Three different PhD positions are offered within the Initial Training Network. Each PhD student position will be based for two years at TU/e in Eindhoven, The Netherlands and also for two years in III-V Lab in Palaiseau, France.

**Research Challenges:** Wavelength division multiplexed transmitters created using photonic integrated circuits (PICs) enable tremendous subsystem footprint reduction in communications systems. They also enable a radical reduction in fabrication cost. However, the complexity of the PIC chip-set is going to increase, and designers have to cope with optical, thermal and RF cross-talk in order to achieve a low cost, yet high-performance and easy-to-test / use PIC chip-set. The main objective of this PhD project is to demonstrate and validate a fully functional photonic integrated circuit transmitter able to operate at 4x25 Gbps and even 10x25Gbps.

**The PhD student tasks:** PhD researcher activities will include

- (a) the design of mask sets to include several optical functionalities, including directly modulated laser diodes, modulators and multiplexers. Two main technology approaches will be studied: planar buried heterostructure and deep ridge/ surface ridge structures.

- (b) The design of the electronic connections which has to be optimised in terms of footprint, RF cross-talk, thermal cross-talk, and fabrication constraints. Characterisation set ups will have to be developed for the chip sets. Specific circuit designs on Alumina will be performed, implemented and tested.
- (c) Characterisation set-ups will be adapted to suit this new class of photonic integrated circuit. Close collaboration with Alcatel-Lucent Bell Labs system teams will also be sought to validate the final test vehicles in transmission systems.

### **Job requirements**

- MSc degree in a relevant area of applied physics, optical science or electrical engineering
- A solid background in semiconductor opto-electronics
- Ability to work with experts from a broad range of scientific and technology backgrounds
- Fluent spoken and written English

*Applicants may also advantageously have experience in one or more of the following areas*

- Clean room technology
- Optical computer aided design software

### **Conditions of employment**

We offer a challenging job at a dynamic and ambitious university through a fixed-term appointment for the period of 4 years. The research in this project must be concluded with the attainment of a PhD-degree. As an employee of the university you will receive a competitive salary as well as excellent employment conditions. A salary is offered starting at € 2083.- per month (gross) in the first year, increasing up to € 2664.- per month (gross) in the last year. Moreover, an 8% bonus share (holiday supplement) is provided annually. Assistance for finding accommodation can be given. The university offers an attractive package of fringe benefits such as excellent technical infrastructure, child care, savings schemes, and excellent sports facilities.

TU/e also offers you the opportunity for personal development by developing your professional skills. We do this by offering every PhD student a series of courses that are part of the Proof Program as an excellent addition to your scientific education.

More information on employment conditions can be found here: <http://w3.tue.nl/en/services/dpo/>.

### **Information and application**

If you are interested in this research opportunity and you would like to informally discuss the project, please contact: Prof. Dr. Kevin Williams (tel: +31 40 247 4331; [K.A.Williams@tue.nl](mailto:K.A.Williams@tue.nl)) or Dr. Xaveer Leijtens (tel: +31 40 247 5112; [X.J.M.Leijtens@tue.nl](mailto:X.J.M.Leijtens@tue.nl)).

For information concerning employment conditions you can contact Mrs W. van Eck, HR advisor ([w.w.k.v.eck@tue.nl](mailto:w.w.k.v.eck@tue.nl)).

## **Application**

If interested, please use 'apply now' button at the top of this page. You should upload the following (all in English):

- a cover letter explaining your motivation and qualification for the position;
- a Curriculum Vitae including course grades, research project achievements and list of publications
- contact information for two referees.
- copies of diplomas
- proof of English language skills where applicable

Please keep file sizes small. Please keep in mind; you can upload only 5 documents up to 2 MB each.